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Sexing Large Aspen Tortrix Pupae

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Large aspen tortrix pupae can be sexed by the position and configuration of the genital pore.

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The large aspen tortrix, *Choristoneura conflictana* (Walker), ranges from the northern regions of North America into the Southwestern United States (Beckwith 1973). It is considered a serious pest because periodically the larvae severely defoliate quaking aspen, *Populus tremuloides* Michx., its principal host. Life history and ecological information have been obtained for *C. conflictana* in Manitoba and Saskatchewan by Prentice (1955), in California by Wickman (1963), and in Alaska by Beckwith (1968, 1973). However, only limited information is available on the habits of this insect in Arizona and New Mexico.

For biological studies, we need to know how to differentiate the pupal sexes. A method for distinguishing pupal sex is required for determining pupal sex ratios, for rearing virgin female moths to be used in sex-attractant studies, and for determining sex of parasitized pupae. This Note describes an easy, reliable method for sexing pupae of *C. conflictana*.

Prentice (1955) determined pupal sex of the large aspen tortrix by counting the number of abdominal segments visible ventrally and posterior to the wing pads. He described the male pupa as having five abdominal segments while the female pupa has only four. Beckwith (1970) used the same method for determining pupal sex in Alaska. Because pupae often "curl" and "telescope," we

have found that counting visible segments is sometimes difficult, confusing, and even nondiagnostic for sex differentiation. The position and shape of the genital opening offers a more reliable, stable, and diagnostic character.

In the female pupa, the genital pore or opening is found ventrally on the 8th abdominal segment (fig. 1A). The opening spans the 8th segment and bisects its caudal margin. The opening extends posteriorly into the cephalic region of the 9th segment. Mesially, the caudal margin of the 8th and the cephalic margin of the 9th segment project cephalad in female pupae.

The shorter genital opening of the male pupa is found ventrally on the 9th abdominal segment (fig. 1B). The opening has distinctly elevated tubercles on each side.

In both sexes of the large aspen tortrix, the anal opening is found on the 10th abdominal segment. The cremaster, a prolongation of the 10th segment, bears eight strongly hooked setae. Setae are absent on the anal rise.

Dorsally, the 1st and 10th abdominal segments are devoid of spines. Two rows of spines, a cephalic row and a caudal row, are found on each of segments 2 through 7. These are sometimes reduced to a single row on segment 8 and completely absent on segment 9. The thoracic region appears to be considerably enlarged while the abdomen is tapering.

Criteria other than the genital opening are less reliable for distinguishing pupal sex. Pupal coloration changes with age and is not a good diagnostic character. Both Prentice (1955) and Beckwith (1973) described pupae of the large aspen tortrix as being light green when first formed, later changing to reddish brown or black. We have observed that both

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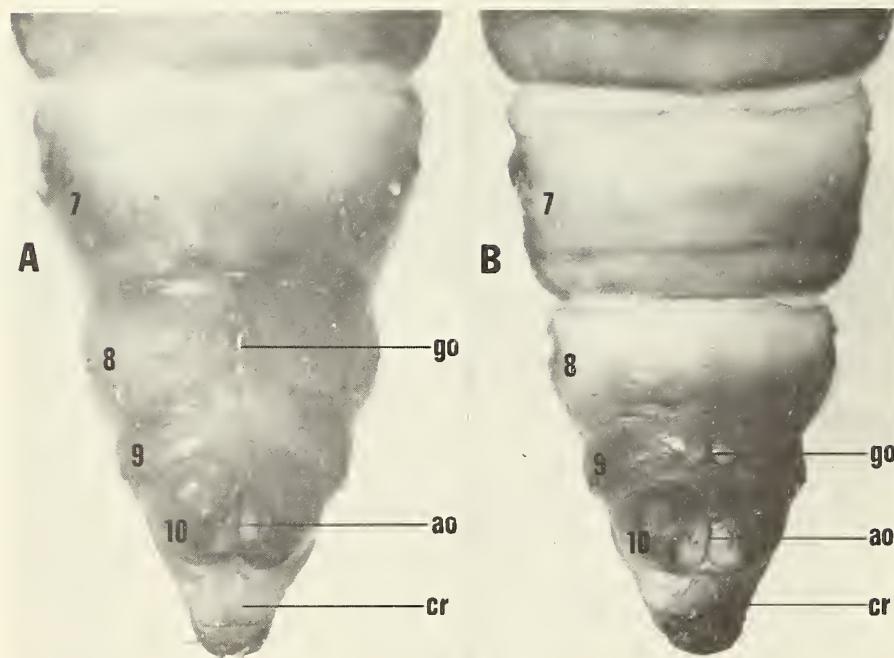


Figure 1.—

Ventral view of female (A) and male (B) pupae of *Choristoneura conflictana*, showing genital (go) and anal (ao) openings, cremaster (cr), and abdominal segments 7-10.

male and female pupae may be reddish brown or black.

Harvey and Stehr (1967) discussed differences in hemolymph pigmentation for several spruce- and pine-feeding *Choristoneura*. Only *C. pinus pinus* Freeman was sexually dimorphic in color, with 100 percent of the males yellow and 100 percent of the females green. For most species of *Choristoneura*, they reported that pupae become progressively darker with age. Although *C. conflictana* males are generally darker than females, coloration by itself is not a good sexing character.

Beckwith (1970) found that large aspen tortrix females were heavier than males when they were reared on the same kind of foliage. He also noted a gradual loss in daily pupal weight until emergence, and that weight varied with humidity. Thus pupal weight also is not a good sexing criterion.

The best criteria for separating pupal sexes of *C. conflictana* are the relative position and shape of the genital opening. Intact pupae can be quickly and accurately sexed. Pupal fragments can also be sexed if the last three abdominal segments are present. Actually, only the 8th or 9th segment need be present if they can be recognized. As often happens with parasitized pupae, the host pupa is broken into fragments when the parasitoid emerges. Dipterous parasitoids characteristically break pupae into about equal halves, leaving the posterior portion of the host pupa intact. These can easily be sexed by the method described here.

Pupae of this large tortricid can be sexed in the field with a 10X hand lens. Confirmation of sex depends on the position of the genital opening.

Relying on coloration or counting number of segments posterior to the wing pads may lead to errors.

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